

***** MINK *****

*** NORMALIZING AND CONTACT RATE FACTORS ***

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
BODY WEIGHT													
Arnold 1986	A	M	-	-	1,420		g				NS	NS	As cited in Arnold and Fritzell 1987.
Birks & Dunstone 1985	A	M	-	-	1,195.3	175.3 SD	g	930	1530	15	Scotland	coastal	Live trapped feral American mink; pregnant females excluded from calculation of female mean.
	A	F	-	-	688.2	64.7 SD	g	560	770	11	1981-83		
Bleavins & Aulerich 1981	A	M	-	-	1,822	95.2 SE	g			6	Michigan 1979	farm-raised	
	A	F	-	-	873	35.5 SE	g			6			
Harding 1934	A	M	-	-			g		2,300		western races	NS	As cited in Linscombe et al 1982.
Harding 1934	A	M	-	-			g		1,400		eastern races	NS	As cited in Linscombe et al 1982.
Hornshaw et al. 1983	A	M	-	SP	1,734	349.7 SD	g			4	Michigan	farm-raised	Mink 13-15 weeks old on Aug 15, fed controlled diet and weighed March 15.
	A	F	-	SP	974	202.2 SD	g			12	1979-80		
Mitchell 1961	A	M	-	SU	1,040		g			5	Montana	river	
	J	M	-	SU	777		g			46	1955-58		
	A	M	-	FA	1,233		g			6			
	J	M	-	FA	952		g			35			
	A	M	-	SP	1,267		g			7			
	J	M	-	SP	1,189		g			21			
	J	M	-	WI	1,175		g			2			
Mitchell 1961	J	F	-	SU	533		g			54	Montana	river	
	A	F	-	SU	550		g			25	1955-58		
	J	F	-	FA	582		g			27			
	A	F	-	FA	586		g			14			
	J	F	-	WI	600		g			1			
	A	F	-	WI	625		g			3			
	J	F	-	SP	617		g			3			
	A	F	-	SP	622		g			9			
NEONATE WEIGHT													
Eagle & Whitman 1987	N	-	-	-			g	6	10		NS	NS	Summarizing unidentified data.

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
Hornshaw et al. 1983	N	B	-	-	8.3	1.54	SD g			38	Michigan 1980-81	farm-raised/lab	Control animals in toxicology study.
GROWTH RATE													
Wehr et al. (unpubl.)	P	M	1	-	7.0		g/day			NS		farm-raised	As cited in NRC 1982; estimated from figure. Age in days: (1) 0-30; (2) 31-90; (3) 91-120; (4) 121-150; (5) 151-180.
	P	F	1	-	6.5		g/day						
	J	M	2	-	21		g/day						
	J	F	2	-	13		g/day						
	J	M	3	-	15		g/day						
	J	F	3	-	6.7		g/day						
	J	M	4	-	9.0		g/day						
	J	F	4	-	1.7		g/day						
	J	M	5	-	4.3		g/day						
J	F	5	-	0.6		g/day							
METABOLIC RATE (OXYGEN)													
Williams 1983	A	M	R	-	26.2	1.7 SE	LO2/kg-day			2	NS	lab	Resting metabolic rates for mink floating in still water; male = 1,236 grams; female = 969 grams; temperature = 20 degrees C.
	A	F	R	-	29.3	1.9 SE	LO2/kg-day			4			
METABOLIC RATE (KCAL BASIS)													
Farrell & Wood 1968a	A	F	BA	-	76.5		kcal/kg-d			3	NS	farm-raised	Based on 34 trials on 3 sleeping mink. Range of body weight of mink = 640-795 g. Value expressed relative to body weight raised to 0.73.
Farrell & Wood 1968b	A	F	1	-	202		kcal/kg-d			5	NS	farm-raised	Average digestible energy intake for maintenance for one set of non-breeding test animals in: (1) small "metabolism" cages; and (2) larger "ranch-type" cages. Approximate range of body weights = 690-920 g. Mean temperature was 10.7 degrees C; the temperature did not go below 7 degrees C.
	A	F	2	-	258		kcal/kg-d			5			
Harper et al. 1978, NRC 1982	J	M	1	-	176		kcal/kg-d			New York	farm-raised	As cited in NRC 1982; based on a conversion of Harper et al.'s (1978) values. Daily maintenance requirement for growing male mink with weight of: (1) 500 g; (2) 2,000 g.	
	J	M	2	-	124		kcal/kg-d						

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
NRC 1982	A	B	-	-	140		kcal/kg-d				NS	farm-raised	Based on a review of studies; recommended for the maintenance of mature mink in captivity.
Perel'dik et al. 1972	-	-	-	-	200		kcal/kg-d				NS	farm-raised	As cited in NRC 1982. Estimate of daily maintenance requirement, year-round.
Williams 1980	A	B	SW	-			kcal/kg-km	12.4			NS	NS	Abstract only. Minimum cost of swimming and running (water temperature not specified). Swimming speed of 0.90 to 2.51 km/hr and running speeds of 0.90 to 7.0 km/hr.
	A	B	RU	-			kcal/kg-km	3.9					
FOOD INGESTION RATE													
Arnold & Fritzell 1987	A	M	-	-	0.13		g/g-day				Manitoba, CAN	prairie potholes	Estimated for period from April-July based on an average male body weight of 1,420 g and Cowan et al.'s 1957 measured prey requirements for captive mink.
Bleavins & Aulerich 1981	A	M	1	WI	0.1194	0.00476 SE	g/g-day			6	Michigan 1979	farm-raised/lab	(1) Using wet weight of feed; (2) using dry weight of feed. Diet consisted of chicken (20%), commercial mink cereal (17%), ocean fish scraps (13%), beef parts, cooked eggs, powdered milk, and added water. Moisture content as fed = 66.2%.
	A	F	1	WI	0.1553	0.00747 SE	g/g-day			6			
	A	M	2	WI	0.0405	0.00161 SE	g/g-day			6			
	A	F	2	WI	0.0525	0.00252 SE	g/g-day			6			
WATER INGESTION RATE													
Farrell & Wood 1968c	A	F	1	-	0.133		g/g-day			5	NS	farm-raised	(1) Water intake from food and free water combined. Water was provided ad libitum from water bottle; food was 65% moisture. (2) Estimate of free water consumption only, based on diet of 65% moisture. This was calculated based on the following conclusion by Farrell & Wood 1968c: the average female mink (780 g) received 66% of its water from food, 14% from fluid water, and 20% from metabolic water.
	A	F	2	-	0.028		g/g-day			5			

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
THERMONEUTRAL ZONE													
Farrell & Wood 1968a	A	F	-	-	16-29		degrees C			3	NS	farm-raised	Estimate: metabolic rate determinations display little variation over this range. Based on 34 trials on 3 animals; body weight of animals ranged from 640 to 795g.

*** DIET ***

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Alexander 1977	B	B	trout	56				10	n lower Michigan	river	Year round.
			non-trout fish	26						-	
			unidentified fish	3						% wet weight;	
			crustaceans	4						stomach contents	
			amphibians	3							
			birds/mammals	6							
			vegetation	1							
			unidentified	1							
Alexander 1977	B	B	trout	52				31	n lower Michigan	stream	Year round.
			non-trout fish	6						-	
			unidentified fish	3						% wet weight;	
			crustaceans	11						stomach contents	
			molluscs	2							
			amphibians	5							
			birds/mammals	17							
			unidentified	4							
Arnold & Fritzell 1987	A	M	ducks	5.2	32.5				Manitoba, CAN	aspen parklands of	Scats collected from radiotracked
			other birds	18.8	21.6					prairie potholes	males.
			eggs	3.3	14.5					-	
			muskrats	42.0	2.1					% dry weight;	
			ground squirrels	14.2	0.5					scats	
			other mammals	15.5	25.3						
			insects	1.0	3.5						
			(sample size)	(270)	(127)						
Birks & Dunstone 1985	A	M	total fish		13.6			5	Scotland 1980-83	pasture, fields,	Data is from all seasons. Feces of
			crustaceans		12.4					conifer plantation	radio-tagged individuals collected
			(11.5% crabs)							on coast	and analyzed.
			mammals		62.7					-	
			(57.2% lagomorphs)							% dry bulk; scats	
			total birds		11.2						
Birks & Dunstone 1985 (continued)	A	F	fish (10.2% blenny)		32.4			4	Scotland 1980-83	coastal (pasture,	Data is for all seasons.
			crustaceans		21.4					field, pine)	Radio-tagged animals tracked, scat
			(19.14% crabs)							-	collected and analyzed.

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Birks & Dunstone 1985 (continued)			mammals (20.2% lagomorphs) birds (7.9% shorebirds)		27.7 18.6					% dry bulk; scats	
Burgess & Bider 1980	B	B	crayfish frogs aquatic insects fish small mammals red squirrels birds large mammals other		20 12.0 6.3 7.6 29.6 10.0 5.0 9.3 0.2			40	Quebec, CAN	stream/riparian area - % volume; scats	Season not specified.
Chanin & Linn 1980	B	B	Salmonids eels other fish Lagomorphs other mammals total birds other		34.2 16.8 2.9 6.3 22.9 10.8 6.1			475	England 1972-73	river - % frequency of occurrence; scats	Data from all seasons combined. Analysis of 475 scats.
Chanin & Linn 1980	B	B	eels other fish Ralliforms other birds Lagomorphs other mammals other		26.4 26.4 15.3 13.9 9.7 5.6 2.7			57	England 1972-73	eutrophic lake - % frequency of occurrence; scats	Data from all seasons combined.
Chanin & Linn 1980	B	B	total fish Ralliform other birds common rat voles other mammals earthworm other		34.4 16.4 7.1 7.7 15.8 7.1 7.7 3.8			153	England 1972-73	Chalk stream - % frequency of occurrence; scats	Data from all seasons combined.
Cowan & Reilly 1973	B	B	muskrats meadow voles other mammals bird eggs passerines waterfowl herpetofauna invertebrates (insects & crayfish) vegetation		18 36 9 0.5 12 15 0.5 6.5 1.5			281	North Dakota 1956-66	river - % dry volume; scats	Data is from both summer and fall. Scat sample collected 6 years and results averaged.

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Eberhardt 1974	B	B	birds	78				NS	NS	NS	As cited in Pendleton 1982.
			mammals	19						-	
			amphibians/reptiles	3						% of prey remains near den, and in scats	
Gilbert & Nancekivell 1982	B	B	total fish		31.4			140	ne Alberta, CAN 1978	lakes	Scats collected from April through November. Totals include prey not identified to species. Values given above include all prey species with % frequency of occurrence greater than 2.
			(northern pike)		(21.0)					-	
			(brook stickleback)		(27.9)					% frequency of occurrence; scats	
			(white sucker)		(2.1)						
			total mammals		63.6						
			(Soricidae)		(11.4)						
			(Lepus americanus)		(19.3)						
			(Synaptomys borealis)		(2.9)						
			(Clethrionomys gapperi)		(3.6)						
			(Microtus sp.)		(4.3)						
			(Microtinae)		(5.0)						
			(Ondatra zibethicus)		(21.4)						
			(mustela vison)		(8.6)						
			total birds		32.9						
			(Gaviformes or Anseriformes)		(16.5)						
			(Gruiformes)		(7.1)						
			total invertebrates		35.0						
			(Insecta)		11.4						
Gilbert & Nancekivell 1982	B	B	total fish		6.6			61	ne Alberta, CAN 1978	streams	Scats collected from April through November. Totals include prey not identified to species. Values given above include all prey species with % frequency of occurrence greater than 2.
			(brook stickleback)		(3.3)					-	
			total mammals		83.6					% frequency of occurrence; scats	
			(Soricidae)		(13.1)						
			(Lepus americanus)		(42.6)						
			(Clethrionomys gapperi)		(3.3)						
			(Microtus sp.)		(2.9)						
			(Microtinae)		(31.2)						
			(Ondatra zibethicus)		(8.2)						
			(Mustela vison)		(3.3)						
			total birds		16.4						
			(Gaviformes or Anseriformes)		(9.9)						
			(Gruiformes)		(4.9)						
			total invertebrates		32.9						
			Insecta		(3.3)						

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Guilday 1949			mammals				41.4	NS	sw	NS	As cited in Pendleton 1982.
			crayfish				14.1		Pennsylvania	-	
			insects				9.4			% frequency of	
			spiders				8.6			occurrence; NS	
			fish				19.5				
			birds				3.1				
			carion				3.1				
			other				0.8				
Hamilton 1959	A	B	fish		32.4		34.1	NS	New York	NS	Collected from trappers.
			mammals		44.0		33.2			-	
			amphibians		18.9		21.9			% frequency of	
			crayfish		12.7		14.4			occurrence; (summer:	
			insects		29.2		6.8			scats; winter:	
			birds		9.3		2.7			stomach & intestine)	
			earthworms		-		2.4				
			molluscs		0.7		1.6				
			reptiles		4.1		1.4				
Hamilton 1936	B	B	Mice (mostly microtu			32.94		70	New York	Various (assumed	Reliability questionable due to
			Fish			18.82			1927-34	near water)	lack of methods description.
			Muskrat			16.47				-	
			Rabbits			4.71				"Frequency indices"	
			Insects			7.06					
			Frogs			2.36					
			Mole			2.36					
			Grasses			1.18					
Hamilton 1940	B	B	muskrat		37.95			300	New York 1939	Montezuma marsh	
			fish		27.25					-	
			aquatic beetles		13.85					% bulk; scats	
			birds		9.05						
			frogs		3.35						
			mice		3.00						
			snakes		2.70						
			rabbits		1.00						
			other		1.85						
Korschgen 1958	A	B	frogs				24.9	372	Missouri	statewide	All caught in December (obtained
			mice & rats				23.9		1951-53	-	from hunters). Nearly two thirds of
			fish				19.9			% dry volume;	the 1,028 stomachs examined were
			rabbits				10.2			stomach contents	empty.
			crayfish				9.3				
			birds				5.6				
			fox squirrels				2.2				
			muskrats				1.3				
			other				2.7				

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
McDonnell & Gilbert 1981	-	-	Microtus pennsylvan.		13.2			164	Ontario, CAN	marsh	Scats collected in summer and fall.
			Ondatra zibethicus		35.0				1978	-	Volume measured by water displacement method.
			Blarina brevicauda		3.1					% volume; scats	
			Anseriformes		15.9						
			Gruiformes		4.3						
			Charadriiformes & Passeriformes		1.4						
			frog		6.9						
			crayfish		8.8						
			insect		4.6						
			snails or bivalves		0.6						
			vegetation		2.0						
			eggshell		0.3						
			other		2.3						
Melquist et al. 1981	-	-	fish		59			659	wc Idaho	river drainage	Season = all. Food items with % frequency of occurrence less than or equal to 2 were not included.
			(mottled sculpin)		(7)				1976-79	-	
			(unident. cyprinid)		(29)					% frequency of occurrence; scats	
			(kokanee salmon)		(3)						
			(unident. salmonid)		(7)						
			(kokanee salmon and unident. salmonid)		(9)						
			(unident. fish)		(12)						
			mammals		43						
			(meadow mouse)		(37)						
			(deer mouse)		(24)						
			(muskrat)		(5)						
			birds		19						
			(unident. waterfowl)		(9)						
			(other birds)		(10)						
			invertebrates		24						
			(terrestrial beetle)		(12)						
			(aquatic beetle)		(7)						
Proulx et al. 1987	B	B	meadow voles		15.5	10.8			Ontario, CAN	marsh	Luther Marsh.
			muskrats		32.7	39.0			1978	-	
			ducks		17.4	10.8				% volume; scats	
			frogs		1.3	16.1					
			crayfish		12.1	4.5					
			insects		3.7	6.3					
			fish		-	1.1					
			vegetation		0.6	4.5					
			unspecified		16.7	6.9					
			(sample size)		(93)	(61)					

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Proulx et al. 1987	B	B	meadow voles		9.0			7	Ontario, CAN	marsh	
			ducks		2.7				1980	-	
			crayfish		35.2					% volume; scats	
			insects		0.3						
			vegetation		0.3						
			unknown		52.5						
Proulx et al. 1987	B	B	muskrat		17.1		24.0		Ontario, CAN	marsh	Luther Marsh.
			ducks		4.0		7.6		1979	-	
			passerine birds		10.2		-			% volume; scats	
			shorebirds		2.8		-				
			other birds		11.4		-				
			vegetation		0.6		-				
			snakes		0.3		-				
			meadow voles		-		5.3				
			frogs		-		4.7				
			fish		-		3.5				
			unknown		53.6		54.9				
			(sample size)		(8)		(8)				
Sealanders 1943	A	M	muskrat				43	102	s Michigan	various areas	Collected from fur buyers. Sample
			cottontail				16		1940-41	-	size reflects both males and
			small mammals				5			% volume; stomach	females.
			large birds				18			contents	
			small birds				TR				
			snakes				2				
			frogs				10				
			fish				5				
			crayfish				1				
Sealanders 1943	A	F	muskrat				14	102	s Michigan	various areas	Collected from fur buyers. Sample
			cottontail				12		1940-41	-	size reflects both males and
			small mammals				17			% volume; stomach	females.
			large birds				11			contents	
			small birds				TR				
			snakes				2				
			frogs				37				
			fish				4				
			crayfish				3				

*** POPULATION DYNAMICS ***

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
HOME RANGE SIZE													
Arnold & Fritzell 1987	A	M	-	-	770		ha			5	Manitoba, CAN	prairie potholes	

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
Arnold 1986	A	M	BR	SU			ha	316	1,626		Manitoba, CAN	prairie potholes	Based on radiotracking data. Home ranges of males in breeding season; males may travel well beyond normal home ranges in search of females. As cited in Eagle and Whitman 1987.
Birks & Linn 1982	A	M	-	-	2.5		km river	1.9	2.9	3	England	riverine	Feral American mink; based on radiotracking data.
	A	F	-	-	2.2		km river	1.5	2.9	2			
Eagle (unpublished)	-	-	-	-			ha	259	380		North Dakota	prairie potholes	As cited in Allen 1986.
Gerell 1970	A	M	-	-	2.63		km stream	1.8	5.0		Sweden	stream	As cited in Linscombe et al. 1982.
	J	M	-	-	1.23		km	1.1	1.4				
	A	F	-	-	1.850		km	1.0	2.8				
Linn & Birks 1981	A	B	-	-			km river	2.8	5.9	8	England	riverine	Feral American mink; based on radiotracking data.
Mitchell 1961	A	F	-	-			ha	7.8		1	Montana	heavy veg. riverine	
	A	F	-	-			ha	20.4		1	1955-58	sparse veg. riverine	
POPULATION DENSITY													
Marshall 1936	A	F	-	WI	0.006		N/ha				Michigan	river	As cited in Eagle and Whitman 1987.
	A	F	-	WI	0.6		N/km river						
McCabe 1949	A	-	-	-	0.05		N/ha				Wisconsin	NS	As cited in Eagle and Whitman 1987.
Mitchell 1961	-	-	-	-	0.085		N/ha				Montana, 1957	river	
Mitchell 1961	-	-	-	-	0.03		N/ha				Montana, 1958	river	
LITTER SIZE													
Enders 1952	-	-	-	-	4.5				17		United States	farm-raised	Averaged from several successful ranches; kit counts. Author notes that litters of over 10 are rare.
Hall & Kelson 1959	-	-	-	-				4	10		North America	NS	
Hornshaw et al. 1983	-	-	-	-	4.2					9	Michigan 1979-80	farm-raised	
Mitchell 1961	-	-	-	-	4			2	8	8	Montana 1955-58	riverine	

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
LITTERS/YEAR													
Ewer 1973	-	-	-	-	1						NS	captive - zoo	As cited in Eisenberg 1981.
Hall & Kelson 1959	-	-	-	-	1						North America	NS	
DAYS GESTATION													
Enders 1952	-	-	-	-	51		days	40	75		United States	farm-raised	Pendleton (1982) notes that the wide range is due to variation in the duration of the pre-implantation period.
Ewer 1973	-	-	-	-	28-30		days				NS	NS	As cited in Eisenberg 1981. Corrected to account for delayed implantation; actual time from conception to birth is much longer.
Hall & Kelson 1959	-	-	-	-			days	39	76		North America	NS	
AGE AT WEANING													
Kostron & Kukla 1970	-	-	1	-	7		weeks				NS	NS	(1) Age fully homeothermic. Cited in Eagle and Whitman 1987.
Svilha 1931	-	-	1	-	37		days				Louisiana	NS	(1) Age observed eating meat. Cited in Eagle and Whitman 1987.
AGE AT SEXUAL MATURITY													
Enders 1952	-	B	-	-	10		months				United States	farm-raised	Usually reach this age by February or March.
Ewer 1973	-	B	-	-	1		year				NS	NS	As cited in Eisenberg 1981.
LONGEVITY													
Eisenberg 1981	-	-	-	-			years		10		NS	captive - zoo	
Enders 1952	-	F	-	-	7		years		11		United States	farm-raised	Number of years females are able to breed in captivity.

*** SEASONAL ACTIVITIES ***

Reference	Begin	Peak	End	Location	Habitat	Notes
MATING						
Burns 1964		April		Alaska	NS	As cited in Eagle and Whitman 1987.
Enders 1952	late Feb		earl Apr	United States	farm-raised	
Humphrey & Zinn 1982		fall		Florida	Cypress Swamp	
Mitchell 1961		March		Montana	riverine	
PARTURITION						
Eagle & Whitman 1987	Apr		Jun	most areas	NS	Presumably not in Florida.
Enders 1952		earl May		United States	farm-raised	
FALL MOLT						
Eagle & Whitman 1987		mid-late fall		NS	NS	General observation.

***** RIVER OTTER *****

*** NORMALIZING AND CONTACT RATE FACTORS ***

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
BODY WEIGHT													
Harris 1968	A	-	-	-			g	5,000	13,700		NS	NS	As cited in Toweill and Tabor 1982.
Lauhachinda 1978	A	M	-	-	8,130	1,150	SD g	5,840	10,420	153	Alabama, Georgia	NS	Live weight. Years of data collection were trapping seasons from 1972-73 to 1976-77. The 2x SE values given by the author were divided by 2 to produce the values shown in the table. SE values are too large relative to the mean and range, however. We assume that these really are standard deviations instead.
	A	F	-	-	6,730	1,000	SD g	4,740	8,720	71			
	Y	M	-	-	6,360	980	SD g	4,410	8,310	26			
	Y	F	-	-	5,830	1,820	SD g	3,750	7,010	30			
Melquist & Dronkert 1987	A	B	-	-			g	5,000	15,000		NS	NS	Summary of studies by Hall and Kelson 1959; Hall 1981; Woolington 1984.
Melquist & Hornocker 1983	A	M	-	-	9,200	600	SE g			4	wc Idaho 1976-81	mountain streams and lakes	Age Y = yearling.
	A	F	-	-	7,900	200	SE g			6			
	Y	M	-	-	7,900	400	SE g			6			
	Y	F	-	-	7,200	100	SE g			3			
Wilson 1959	A	M	-	-	8,250		g			138	N Carolina	coastal	Season for data = fall and winter. As cited in Tumlison and Shalaway 1985.
	A	F	-	-	7,002		g			100			
NEONATE WEIGHT													
Hamilton & Eadie 1964	N	-	-	-	132		g			2	New York	NS	Near-term fetuses from wild-trapped females.
Hill & Lauhachinda 1981	N	-	-	-	140-145		g			4	Alabama, Georgia	NS	Near-term fetuses from wild-trapped females.
Melquist & Dronkert 1987	N	-	-	-	120-160		g				NS	NS	
PUP GROWTH RATE													
Liers 1951a	P	-	-	-	26.7		g/day			1	NS	NS	Age 10 to 20 days. As cited in Toweill and Tabor 1982.

*** DIET ***

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Alexander 1977	B	B	trout	42				4	n lower Michigan	aquatic	Year round.
			non-trout fish	32						-	
			unidentified fish	9						% wet weight;	
			crustaceans	2						stomach contents	
			unidentified	15							
Anderson & Woolf 1987b	B	B	fish	97	69	98	99	822	nw Illinois 1981-83	Mississippi River	Spring = March-May; summer = June; fall = October-November; and winter = December- February.
			(sunfish)	(31)	(31)	(80)	(52)			-	
			(minnow/carp)	(52)	-	(17)	(44)			% frequency of	
			(herring)	(49)	(38)	(10)	(40)			occurrence; scats	
			(bass)	(26)	-	(5)	(14)				
			frogs	3	6	11	16				
			crayfish	12	50	8	7				
			dragonfly nymph	2	-	6	2				
			birds (unidentified)	4	13	3	1				
			(sample size)	(277)	(16)	(167)	(362)				
Chabreck et al. 1982	A	B	fish				83.0	53	Louisiana 1976-80	freshwater swamps	
			(longear sunfish)				(9.4)			-	
			(killifishes)				(15.1)			% frequency of	
			(striped mullet)				(11.3)			occurrence;	
			(bowfin)				(18.9)			digestive tracts	
			(largemouth bass)				(11.3)				
			blue crabs				3.8				
			crayfish				34				
			mammals				7.5				
			birds				0				
			snakes				5.7				
			molluscs				3.8				
Chabreck et al. 1982	A	B	fish				83.3	126	Louisiana 1976-80	saltmarsh	
			(sheepshead minnow)				(57.9)			-	
			(diamond killifish)				(37.3)			% frequency of	
			(gulf killifish)				(15.9)			occurrence;	
			(top minnow)				(15.9)			digestive tracts	
			(flounder)				(13.5)				
			(mullet)				(11.9)				
			(sailfin molly)				(10.3)				
			blue crabs				19.8				
			crayfish				1.6				
			mammals				7.9				
			birds				2.4				
			molluscs				1.6				
			shrimp				1.6				

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Gilbert & Nancekivell 1982	B	B	fish (northern pike) (brook stickleback) (white sucker) mammals (Microtus sp.) (muskrat) (river otter) birds (Gaviformes or Anseriformes) (Gruiformes) (Charadriiformes) invertebrates (Insecta) (Mollusca)		78.9 (8.4) (72.1) (6.0) 15.9 (2.0) (8.0) (5.2) 21.5 (16.4) (2.8) (2.0) 59.4 (21.1) (3.2)			251	ne Alberta CAN 77-78	lakes - % frequency of occurrence; scats	Season = year round. Species with percentages of less than 2% not included in this summary. Evidence of otter fur in scats believed to be due to grooming.
Gilbert & Nancekivell 1982	B	B	fish (northern pike) (brook stickleback) (white sucker) (arctic grayling) mammals (Lepus americanus) birds (Gaviformes or Anseriformes) invertebrates Insecta Mollusca		91.1 (13.4) (63.6) (23.9) (2.4) 3.2 (2.0) 9.3 (7.6) 45.8 (18.6) (3.2)			247	ne Alberta CAN 77-78	streams - % frequency of occurrence; scats	Season = year round. Species with percentages of less than 2% not included in this summary.
Greer 1956	A	B	fish invertebrates		99.9 45.1				Montana	river - % frequency of occurrence; scats	Season not specified. As cited in Tumilson and Shalaway 1985.
Greer 1955	A	B	invertebrates (aquatic insects) (fr water shrimp) fishes (trout) (sculpin) (sunfish) (suckers) salamanders snakes frogs mammals birds (sample size)	41.6 (19.6) (14.3) 91.4 (23.7) (20.5) (47.1) (39.8) 0.3 0.2 19.6 8.1 6.7 (596)	44.2 (19.2) (8.9) 92.9 (9.8) (20.9) (72.8) (21.0) 0.7 0.7 19.2 5.3 4.1 (604)	33.3 (10.7) (10.7) 100 (33.3) (21.3) (60.0) (45.3) 1.3 - 10.7 2.7 1.3 (75)	26.3 (4.0) (4.0) 100 (29.3) (25.3) (33.3) (59.6) - - 9.1 4.0 1.0 (99)	596	nw Montana 1952-53	lakes and streams - % frequency of occurrence; scats	Winter = January-March; spring = April- June; summer = July-September; fall = October-December.

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Grenfell 1974	B	B	crayfish		98			118	c California	marsh - % frequency of occurrence; scats	Year round. As cited in Tumilson and Shalaway 1985.
Hamilton 1961	A	B	fish crayfish frogs aquatic insects mammals				70.0 34.7 24.8 13.5 4.3	141	New York	Adirondacks - % frequency of occurrence; digestive tract	As cited in Tumilson & Shalaway 1985.
Knudsen & Hale 1968	A	B	fish only fish and crayfish crayfish only	91 9 0	63 12 24	72 10 12	67 20 13	184	WI, MI, MN, 1951-54	NS - % frequency of occurrence; scats	Trace amounts of other items (e.g., insects & duck) also found.
Lagler & Ostenson 1942	A	B	game & pan fish forage fish unidentified fish amphibians other vertebrates insects crayfish	22.7 35.9 3.9 25.2 4.5 0.4 7.4				95	Michigan 1940-41	trout waters - % wet volume; stomach contents	Animals collected in March and April. Game and pan fish includes trout, bullheads, northern pike, perch, bass, and sunfish. Forage fish includes suckers, minnows, mudminnows, darters, muddlers, and sticklebacks.
Lagler & Ostenson 1942	A	B	game & pan fish forage fish unidentified fish amphibians other vertebrates insects crayfish	65.3 11.2 2.0 14.4 0.5 2.9 3.7				40	Michigan 1940-41	non-trout waters - % wet volume; stomach contents	Animals collected in March and April. Game and pan fish includes bullheads, northern pike, perch, bass, and sunfish. Forage fish includes suckers, minnows, mudminnows, darters, muddlers, and sticklebacks.
Larsen 1984	A	B	fish (sculpins) (greenlings) (rockfish) invertebrates birds mammals plants		96 (65) (14) (17) 30 1 <1 <1			272	se Alaska	coastal - % frequency of occurrence; scats	Year round data.
Lauhachinda 1978	B	B	fish crayfish birds				91.7 58.3 8.3	12	c Alabama 1975-77	riverine - % frequency of occurrence; scats	Data from trapping seasons.

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Lauhachinda 1978	A	B	fish (Centrarchidae) (Catostomidae) (Ictaluridae) (Cyprinidae) amphibians crayfish other arthropods molluscs (snail) birds plant material				83.2 (53.6) (12.1) (10.5) (6.3) 5.4 62.5 10.8 0.9 0.3 3.8	315	Alabama, GA 1972-77	NS - % frequency of occurrence; digestive tracts	Data from trapping seasons.
Loranger 1981	-	B	Ictaluridae Centrarchidae Salmonidae Percidae Esocidae Castostomidae Cyprinidae Cyprinodontidae unidentified fish bullfrogs crayfish vegetative matter unidentified			28.2 20.3 5.2 3.5 0.2 5.5 3.2 0.6 9.9 14.0 0.4 0.1 8.9		56	Massachusetts 76-78	NS - % dry volume; stomach contents	Season = late fall - early winter. Food material was air-dried for a 24-48 hour period prior to examination; % volume measured by water displacement. Carcasses supplied by trappers from eight counties following the 1976-77 and 1977-78 trapping seasons.
Melquist & Hornocker 1983	A	B	fish (sucker) (sculpin) (squawfish) (perch) (whitefish) invertebrates birds mammals reptiles (sample size)	100 (52) (40) (5) (22) (21) 2 <1 1 0 (264)	93 (47) (31) (4) (3) (10) 7 12 4 1 (327)	97 (17) (38) (1) (7) (24) 10 1 3 0 (1053)	99 (30) (42) (6) (9) (66) 12 <1 1 0 (258)		wc Idaho 1976-81	mountain streams and lakes - % frequency of occurrence; scats	Most of the fish taken were greater than 30 cm in length.
Melquist et al. 1981	A	B	fish (largescale sucker) (mottled sculpin) (north. squawfish) (unident. cyprinid) (brown bullhead) (yellow perch) (mountain whitefish) (kokanee salmon) (unident. salmon) (kokanee & unident. salmon)		97 (29) (38) (3) (24) (1) (9) (27) (9) (34) (43)			1,902	wc Idaho 1976-79	river drainage - % frequency of occurrence; scats	Season = all.
(continued)											

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Melquist et al. 1981 (continued)			(unident. fish)		(1)						
			mammals		3						
			(jumping mouse)		(2)						
			(unident. mammal)		(1)						
			birds		3						
			(waterfowl)		(2)						
			(other birds)		(1)						
			invertebrates		8						
			(aquatic beetle)		(1)						
			(stonefly nymph)		(7)						
			(unident. invert.)		(1)						
Modafferi & Yocom 1980	A	B	starry flounder		56.1			100	n California	coastal	Volume measured by water
			crabs (Cancer spp.)		37.6				1964	-	displacement method.
			birds		4.6					% volume; dry scats	
			dragonfly		1.3						
			ostracods and snails		0.4						
Pierce 1979	A	B	crayfish		82			209	Virginia	Great Dismal Swamp	As cited in Tumilson and Shalaway
			fish		62				1977-78	-	1985.
										% frequency of occurrence; scats	
Ryder 1955 (canadensis)	B	B	game & pan fishes	40.7				54	Michigan	trout & non-trout	25 animals from non-trout waters,
			other fish	55.5					1942-43	waters	21 from trout waters, 8 from
			fish remains	27.8						-	unclassified areas.
			amphibians	16.7						% frequency of	
			crayfish	22.2						occurrence; stomach	
			insects	13.0						contents	
Sheldon & Toll 1964	A	B	fish	90	87	97	99	-	c Mass.	reservoir	Other fish for which value for all
			(centrarchids)	(26)	(39)	(84)	(74)		1955-57	-	seasons was below 5: white perch,
			(yellow perch)	(64)	(62)	(30)	(48)			% frequency of	brown bullhead, banded killifish,
			(white sucker)	(8)	(4)	(15)	(17)			occurrence; scats	and johnny darter.
			(golden shiner)	-	(2)	-	(17)				
			(chain pickerel)	(1)	(3)	(5)	(8)				
			invertebrates	55	68	53	34				
			(crayfish)	(53)	(48)	(48)	(32)				
			(wasp)	-	(24)	(1)	-				
			(unident. insects)	(4)	(10)	(5)	(4)				
			vegetation	-	(28)	(2)	-				
			(blueberry)	-	(28)	-	-				
			mammals (unident.)	4	4	-	3				
			birds (unident.)	1	1	-	1				
			sample size	*73*	*226*	*116*	*102*				

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Shirley 1985	A	B	crayfish fish parts birds, crabs, snakes alligators, mammals	89 25 TR TR				1048	sw Louisiana 1982	brackish marsh - % frequency of occurrence; scats	Trace prey considered unimportant dietary components by author.
Stenson et al. 1984	A	B	fish (Embiotocidae) (Cottidae) (Pleuronectiformes) (Blennoidea) (Scorpaenidae) (Hexagrammidae) crustaceans birds		99.4 (42.2) (40.5) (40.0) (33.3) (30.1) (13.1) 7.2 4.2			69	British Columbia	coastal marine - % frequency of occurrence; scats	Season is year round.
Stenson et al. 1984	A	B	fish birds crustaceans				86.9 13.0 2.9	69	British Columbia	coastal marine - % frequency of occurrence; stomachs	Stomachs collected during the trapping season (December-February).
Toll 1961	A	B	fish invertebrates vegetable matter mammals birds		92 56 13 3 1			517	c Mass. 1955-57	wildlife reservation - % frequency of occurrence; scats	Data from year round. As cited in Tumilson and Shalaway 1985.
Toweill 1974	A	B	fish (Cottidae) (Salmanidae) (Cypridae) (Ictaluridae) crustacea amphibians birds molluscs				80 (31) (24) (24) (7) 33 12 8 11	75	w Oregon 1970-72	NS - % frequency of occurrence; digestive tracts	
Wilson 1985	A	B	fish (carp) (suckers) (killifish) (minnows) (eels) (sunfish) (catfish) (white perch) (pickerel) crustacea insects birds				91 (11) (11) (9) (7) (7) (15) (11) (7) (7) 39 6 3	30	North Carolina	swamps & marshes - % frequency of occurrence; scats and digestive tracts	Combined sample of 10 digestive tracts and 20 scats.

*** POPULATION DYNAMICS ***

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
HOME RANGE SIZE													
Erickson et al. 1984	A	B	-	-			ha	400	1,900		Missouri	inland marsh/streams	As cited in Melquist and Dronkert 1987. Habitat is in the Swan Lake National Wildlife Refuge.
Erickson et al. 1984	A	-	-	-			km	11	78		Missouri	inland marsh/streams	As cited in Melquist and Dronkert 1987. Habitat is in the Lamine River Wildlife Area.
Foy 1984	-	M	-	-	400		ha				se Texas	coastal marsh	As cited in Tumblison and Shalaway 1985. Total range (includes both sexes) = 184 - 461 ha.
	-	F	-	-	295		ha				1981-83		
Larsen 1983	-	-	-	-			ha	900	2,500		se Alaska	coastal	As cited in Melquist and Dronkert 1987. Author also provides home ranges in km of shore; 19 - 40 km.
Mack 1985	-	-	-	-			ha	2,900	5,700		Colorado	mountain valley	As cited in Melquist and Dronkert 1987. In this study, home ranges tended to be largest in the spring.
Melquist & Hornocker 1983	J	B	1	-	22	7.8 SD	km	8	29	7	wc Idaho	shorelines of lakes	Seasonal home range based on radiotracking. Due to lack of obvious trends, data combined across seasons: (1) solitary juveniles (fall and winter); (2) solitary animals (all seasons); (3) adult females and juveniles of both sexes in family groups (all seasons).
	Y	F	2	-	32	6.2 SD	km	25	40	4	1978-81	and streams	
	Y	M	2	-	43	20 SD	km	10	78	7			
	A	F	2	-	31	9.2 SD	km	23	50	7			
	B	B	3	-	28	7.5 SD	km	15	39	11			
Woolington 1984	-	-	-	-			km	1.0	23		se Alaska	coastal	As cited in Melquist and Dronkert 1987.
POPULATION DENSITY													
Erickson et al. 1984	A	B	-	-	0.0025		N/ha				Missouri	inland marsh/streams	Swan Lake National Wildlife Refuge. As cited in Melquist and Dronkert 1987.
Erickson et al. 1984	A	B	-	-	0.13		N/km				Missouri	inland marsh/streams	Lamine River Wildlife Area. As cited in Melquist and Dronkert 1987.
Foy 1984	-	-	-	-			N/ha	0.0094	0.014		se Texas	coastal marsh	As cited in Melquist and Dronkert 1987.

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
Larsen 1983	-	-	-	-			N/km	0.48	0.53		se Alaska	coastal	As cited in Melquist and Dronkert 1987.
Melquist & Hornocker 1983	B	B	-	-	0.26		N/km	0.17	0.37		wc Idaho 1976-81	mountain streams	Density along length of mountain streams.
	A	F	BR	-	0.05		N/km						
	A	M	BR	-	0.019		N/km						
	Y	B	-	-	0.071		N/km						
Reid 1984	-	-	-	-			N/km	0.06	0.1		Alberta CAN	lake	Habitat = lake in northwestern boreal forest. As cited in Melquist and Dronkert 1987.
Trippensee 1953	-	-	-	-	0.0001		N/ha				Oregon/Washington	National Forest	Habitat described as approximately 109,000 square km of "nearly primitive otter range."
Woolington 1984	-	-	-	-	0.85		N/km				se Alaska	coastal - island	As cited in Melquist and Dronkert 1987.
LITTER SIZE													
Anderson & Scanlon 1981	-	-	1	-	2.75	0.177 SE				8	e Virginia 1979-80	NS	Measure: (1) embryo counts; (2) corpora lutea counts.
	-	-	2	-	2.5	0.089 SE				24			
Docktor et al. 1987	-	-	1	-	0.53	0.91 SD		0	3	15	Maine 1982-83	NS	Corpora lutea counts; Age classes: (1) 1 year; (2) 2 years; (3) 3 years; (4) 4 years; (5) 5 to 12 years; (6) all ages combined.
	-	-	2	-	0.87	0.96 SD		0	3	16			
	-	-	3	-	1.60	1.42 SD		0	4	10			
	-	-	4	-	2.29	1.25 SD		1	5	7			
	-	-	5	-	2.67	1.40 SD		0	6	15			
	-	-	6	-	0.82	1.29 SD		0	6	114			
Hamilton & Eadie 1964	-	-	-	-	2.1	0.7 SD				9	New York	NS	Implanted embryo count conducted in March and April.
Hill & Lauhachinda 1981	-	-	-	-	2.68	0.71 SD		1	4	57	Alabama, GA 1972-77	NS	Embryo count; animals collected from trappers from 1972-77. Reproductive tracts of 56 of 116 females (all 2 years or older) contained embryos or blastocysts.
Hooper & Ostenson 1949	-	-	-	-	2-3			1	6		California	NS	As cited in Melquist & Dronkert 1987; measure not specified.
Johnstone 1978	-	-	-	-	2.3						NS	captive	As cited in Eisenberg 1981; measure not specified.
Lauhachinda 1978	-	-	-	-	2.6			1	4	48	Alabama, GA 1972-77	NS	Number of fetuses per pregnant female. Data from 1972-73 through 1976-77 trapping seasons.

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
Liers 1966	-	-	-	-	3-4					5	Canada	lab	As cited in Tumilson and Shalaway 1985; measure not specified.
McDaniel 1963	-	-	-	-	3.0	1.0 SD					Florida	NS	As cited in Melquist and Dronkert 1987; measure not specified.
Melquist & Hornocker 1983	-	-	-	-	2.4						Idaho	NS	Number of pups per female that survived from birth until fall/early winter.
Mowbray et al. 1979	-	-	-	-	2.73	0.77 SD		1	4	22	Maryland 1975-77	wetlands	Implanted embryos.
Tabor & Wight 1977	-	-	1	-	2.73	0.24 SE		2	4	11	w Oregon 1970-71	NS	Age classes: (1) 2 years; (2) 3 years; (3) 4 to 11 years; (4) all ages combined. Measured blastocysts.
	-	-	2	-	2.80	0.20 SE		2	4	10			
	-	-	3	-	2.86	0.21 SE		2	4	14			
	-	-	4	-	2.80	0.12 SE		2	4	35			
Tabor & Wight 1977	-	-	1	-	2.5			2	3	2	w Oregon	NS	Age classes: (1) 2 years; (2) 3 years; (3) 4 to 11 years; (4) all ages combined. Measured implanted embryos.
	-	-	2	-	3.0					1			
	-	-	3	-	3.0					1			
	-	-	4	-	2.75			2	3	4			
LITTERS/YEAR													
Trippensee 1953	-	-	-	-	1						NS	NS	
DAYS GESTATION													
Hamilton & Eadie 1964	-	-	-	-	365		days				New York	NS	Entire period from copulation to birth of young; active gestation period is about two months.
Johnstone 1978	-	-	-	-	56		days				NS	captive	Active gestation (post-implantation). As cited in Eisenberg 1981.
Lancia & Hair 1983	-	-	-	-	60-63		days				NS	NS	Active gestation (post-implantation). As cited in Melquist and Dronkert 1987.
Liers 1951b	-	-	-	-			days	290	380		Wisconsin	captive	Entire period from copulation to birth of young.

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
AGE AT WEANING													
Johnstone 1978	-	-	-	-	112-140		days				NS	captive	As cited in Eisenberg 1981.
Harris 1968	-	-	-	-			days	91			NS	NS	Otters still nursing at 91 days. Eating solid foods by 9th week.
AGE AT SEXUAL MATURITY													
Hamilton & Eadie 1964	-	F	-	-	2		years				New York	NS	Wild-trapped animals.
	-	M	-	-	2		years						
Harris 1969 (canadensis)	-	M	-	-	2		years				Canada	captive/zoo	As cited in Tumblison and Shalaway 1985.
	-	F	-	-	2		years						
Liers 1951b	-	B	-	-	2		years				Minnesota	captive	In general, males cannot be counted on as successful breeders until they reach 5-7 years of age.
ANNUAL MORTALITY													
Lauhachinda 1978	A	M	-	-	17.8		%/year				Alabama, GA 1972-77	riverine	
	A	F	-	-	20.3		%/year						
Mowbray et al. 1979	J	F	-	-	17		%/year			23	Maryland 1974-77	NS	Adjusted mortality; estimated on the basis of age classes. Juveniles = < 1 year old; adult value applies to ages 1 through 9.
	A	F	-	-	31		%/year						
Tabor & Wight 1977	J	-	1	-	32		%/year				Oregon	NS	Age classes: (1) birth to 1 year; (2) yearling; (3) 2-11 years.
	J	-	2	-	54		%/year						
	A	-	3	-	27		%/year						
LONGEVITY													
Eisenberg 1981	-	-	-	-			years		19	1	NS	captive-zoo	
Grinnell et al. 1937	-	-	-	-	10-15		years				California	NS	As cited in Melquist and Dronkert 1987.
Lauhachinda 1978	A	B	-	-			years		15	439	Alabama, GA 1972-77	riverine	
Liers 1966	A	F	-	-			years		23	1	NS	captivity	As cited in Tumblison and Shalaway 1985.
Scheffer 1958	-	-	-	-			years		14.5	1	Washington	captive/zoo	As cited in Tumblison and Shalaway 1985.

*** SEASONAL ACTIVITIES ***

Reference	Begin	Peak	End	Location	Habitat	Notes
MATING						
Hamilton & Eadie 1964	Mar		Apr	New York	NS	
Harris 1969	mid Feb		mid Apr	NS	captive/zoo	As cited in Tumblison and Shalaway 1985.
Hooper & Ostenson 1949	Jan	Mar-Apr	May	Michigan	NS	As cited by Toweill and Tabor 1982.
Humphrey and Zinn 1982		Fall		Florida	cypress swamp	
Lauhachinda 1978	winter	late winter	spring	AL, FL, GA 1972-77	NS	
Liers 1951b	Dec		earl Apr	Minnesota	captive	
MacFarlane 1905	Mar	Apr	May	Mackenzie River, CAN	NS	As cited in Toweill and Tabor 1982.
Melquist & Dronkert 1987		earl spring		temperate regions	NS	Summary of several studies.
Trippensee 1953	Feb/Mar			NS	NS	Mating may continue through summer in favorable locations.
PARTURITION						
Anderson 1981	Feb 25		Mar 31	Virginia 1979-81	NS	As cited in Tumblison and Shalaway 1985.
Hamilton & Eadie 1964	Mar		Apr	New York	NS	
Hill and Lauhachinda 1981	earl Jan		earl Mar	AL, GA 1972-77	NS	
Lauhachinda 1978	late Jan		May	Alabama, Georgia	NS	Animals collected from trappers during the 1972-73 and the 1976-77 trapping seasons.
Liers 1966	Dec 25		Mar 25	Canada	lab	As cited in Tumblison and Shalaway 1985.

Reference	Begin	Peak	End	Location	Habitat	Notes
Melquist & Hornocker 1983	late Mar		earl Apr	wc Idaho 1976-81	mountain streams	
Mowbray et al. 1979	Mar 10		May 20	Maryland 1974-77	Chesapeake Bay area	
Tabor and Wight 1977	earl Apr			w Oregon	NS	As cited in Mowbray et al. 1979.
Toweill & Tabor 1982	Nov	Mar-Apr	May	NS	NS	Summary of several studies.
DISPERSAL						
Melquist & Hornocker 1983		Apr - May		wc Idaho 1976-81	mountain streams	Dispersal at age 12-13 months.

***** HARBOR SEAL *****

*** NORMALIZING AND CONTACT RATE FACTORS ***

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
BODY WEIGHT													
Ashwell-Erickson & Elsner 1981 (richardsi)	J	F	-	-	40		kg 2 yrs				Bering Sea, Alaska	coastal	Amount of years in units column is age of seals. Total of 155 seals from the Aleutian Ridge and Pribilof Islands. Values estimated from the calculated growth curve presented in paper.
	J	F	-	-	56		kg 4 yrs						
	J	F	-	-	67		kg 6 yrs						
	A	F	-	-	76		kg 8 yrs						
	A	F	-	-	82		kg 10 yrs						
	A	F	-	-	90		kg 12 yrs						
	A	F	-	-	101		kg 16 yrs						
	A	F	-	-	112		kg 24 yrs						
	J	M	-	-	49		kg 2 yrs						
	J	M	-	-	70		kg 4 yrs						
	J	M	-	-	84		kg 6 yrs						
	A	M	-	-	95		kg 8 yrs						
	A	M	-	-	102		kg 10 yrs						
	A	M	-	-	110		kg 12 yrs						
	A	M	-	-	120		kg 16 yrs						
	A	M	-	-	124		kg 24 yrs						
Boulva & McLaren 1979 (concolor)	A	M	-	-	90.0		kg				e Canada 1968-73	marine	Asymptotic weights.
	A	F	-	-	70.0		kg						
FAO Adv. Comm. 1976	A	M	-	-	87.6		kg				NS	NS	Male length - 1.6 meters; female length 1.5 meters. As cited in Ronald et al. 1982.
	A	F	-	-	64.8		kg						
Irving 1972	A	F	-	-	89.0		kg				Arctic	NS	As cited in Ronald et al. 1982.
Pitcher & Calkins 1979 (richardsi)	A	M	-	-	84.6	11.3 SD	kg			112	Gulf of Alaska 1975-78	coastal/marine	Average length (+/- 95% CL): Males 155.4 (+/- 1.4) cm; females 144.8 (+/- 1.1) cm. All animals were seven years of age or older.
	A	F	-	-	76.5	17.7 SD	kg			134			
BODY FAT													
Ashwell-Erickson et al. 1979 (richardsi)	J	-	1	SP	27		% body wt				Alaska 1977-78	captive	Data from one seal from April of first year year, September of second year, and May of second year. Weight of seal (kg); (1) 39; (2) 47 kg; (3) 49 kg. Determined using the titrated water method.
	J	-	2	FA	24		% body wt						
	J	-	3	SP	29		% body wt						

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
NEONATE WEIGHT													
Bigg 1969a (richardsi)	N	B	-	-	10.2	0.77 SE	kg				British Columbia	coastal/marine	SE estimated from 95% CL of 1.5; average length of neonates was 81.6 (+/- 6.2 95% CL) cm. As cited in Pitcher and Calkins 1979.
Bryden 1972	N	-	-	-	10.0		kg				NS	NS	As cited in Ronald et al. 1982.
FAO Adv. Comm. 1976	N	-	-	-			kg	9.0			NS	NS	Length 0.75 m. As cited in Ronald et al. 1982.
Klinkhart 1967 (richardsi)	N	M	-	-	12.8		kg			34	Alaska	marine	As cited in Newby 1973.
	N	F	-	-	13.3		kg			34			
Newby 1973 (richardsi)	N	M	-	-	14.8	2.74 SD	kg			5	Washington	marine	Mean male weight listed as 15,270 g in Table 1 but 14,810 g on page 543. We believe the lower value is more likely to be correct.
	N	F	-	-	10.7	2.76 SD	kg			13	1969-72		
Newby 1978 (richardsi & P. largha)	N	-	-	-			kg	9.1	11.8	2	Pacific coast	coastal/marine	Data is for richardsi subspecies and P. largha.
Pitcher & Calkins 1979 (richardsi)	N	M	-	-	12.0	0.51 SE	kg				Tugidak Island, Alaska	coastal/marine	Male mean standard length (+/- 95% CL) was 78.6 (+/- 2.7) cm; female length was 76.5 (+/- 1.9) cm. Total of 23 animals measured; SE estimated from 95% CL.
	N	F	-	-	11.5	0.31 SE	kg				1975-78		
Rosen 1989 (concolor)	N	F	-	-	8.5		kg				Gulf of St. Lawrence	coastal/marine	Location is Miquelon Islands; male birth weight is significantly greater than female birth weight.
	N	M	-	-	10.1		kg						
PUP GROWTH RATE													
Rosen 1989 (concolor)	P	F	-	-	790		g/day				Gulf of St. Lawrence	island/marine	Pre-weaning growth rate on Island of Miquelon; birth weight: male = 10,100 g; female = 8,500 g.
	P	M	-	-	520		g/day						
WEANING WEIGHT													
Bigg 1969a (richardsi)	-	B	-	-	24,000		g				British Columbia	marine	As cited in Boulva and McLaren 1979. Weight doubled from birth.
Bryden 1972	-	B	-	-	24,000		g				NS	marine	As cited in Ronald et al. 1972.

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
METABOLIC RATE (OXYGEN)													
Ashwell-Erickson & Elsner 1981 (richardsi & P. largha)	J	-	1	-	5.97		lO ₂ /kg-d				Bering Sea, Alaska	captives from Bering Sea	Basal metabolic rate for harbor and spotted (P. largha) seals at rest in air and water at temperatures ranging from -20 to +20 C (air) and -1.8 to 16 C (water). Trials did not indicate a difference in rates at different temperatures. Age of seals (years): (1) 0.2 - 0.7; (2) 1; (3) 3; (4) 4; and (5) 9. Values for ages 4 and 9 were estimated from Figure 53.5.
	J	-	2	-	5.76		lO ₂ /kg-d						
	J	-	3	-	5.83		lO ₂ /kg-d						
	J	-	4	-	4.9		lO ₂ /kg-d						
	A	-	5	-	4.0		lO ₂ /kg-d						
Davis et al. 1985	J	B	R	-	7.3		lO ₂ /kg-day			2	California	lab	Juvenile is a yearling; weight = 33 kg. Adult female weight = 63 kg.
	A	F	R	-	6.6		lO ₂ /kg-day			1	1982-83		
METABOLIC RATE (KCAL BASIS)													
Ashwell-Erickson & Elsner 1981 (richardsi)	J	B	1	-	85.5		kcal/kg-d				Bering Sea, Alaska	NS	Basal metabolic rate used in energy flow modeling. Age of seals; (1) birth to weaning; (2) weaning to one year; (3) 1 to 4 years. For ages 16 and under, authors present equation BMR = 70 x (weight to the 0.75 power) kcal/day.
	J	B	2	-	59.5		kcal/kg-d						
	J	B	3	-	57.5		kcal/kg-d						
FOOD INGESTION RATE													
Ashwell-Erickson & Elsner 1981 (P. largha)	-	B	1	-	0.13		g/g-day			2	from Bering Sea	captive	Mean food consumption of Atlantic mackerel by 1 male and 1 female largha (spotted) seal during: (1) first year; (2) second year; (3) third year; (4) fourth year; and (5) fifth through ninth years.
	-	B	2	-	0.08		g/g-day			2			
	-	B	3	-	0.05		g/g-day			2			
	-	B	4	-	0.04		g/g-day			2			
	-	B	5	-	0.03		g/g-day			2			
Ashwell-Erickson & Elsner 1981 (richardsi & P. largha)	J	B	1	-	0.04		g/g-day				NS	captive	Approximate consumption in: (1) March-August; (2) winter. Based on consumption of subadult harbor and largha (spotted) seals.
	J	B	2	-	0.08		g/g-day						
Ashwell-Erickson & Elsner 1981 (richardsi)	J	B	1	-	121.6		kcal/kg-d				Bering Sea, Alaska	NS	Model results based on food ingestion and gross energy content of food. Age of seals (years) and mean weight (kg): (1) 1 - 38.7; (2) 2 - 44.9; (3) 4 - 60.7; (4) 6 - 75.2; (5) 8 - 88.3; (6) 10 - 97.4; (7) 12 - 103.8; (8) 14 - 108.2; and (9) 20 - 115.0.
	J	B	2	-	89.0		kcal/kg-d						
	J	B	3	-	63.6		kcal/kg-d						
	J	B	4	-	50.0		kcal/kg-d						
	A	B	5	-	41.5		kcal/kg-d						
	A	B	6	-	35.3		kcal/kg-d						
	A	B	7	-	32.2		kcal/kg-d						
	A	B	8	-	28.5		kcal/kg-d						
	A	B	9	-	26.4		kcal/kg-d						

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
Ashwell-Erickson & Elsner 1981 (richardsi)	A	B	-	-	0.06-0.08		g/g-day				NS	NS	LG = lactating or gestating. Summary of several studies; estimates for free-living seals.
	A	F	LG	-	0.10		g/g-day						
Boulva and McLaren 1979 (concolor)	A	B	1	SU	0.05		g/g-day				e Canada	marine	Ingestion rates for (1) 20 kg seal, (2) 60 kg, and (3) 100 kg seal. The weight of stomach contents (if < 30% digested) and an estimate of the % already digested were used to estimate the weight of the food ingested in the previous 24 hours.
	A	B	2	SU	0.04		g/g-day				1968-73		
	A	B	3	SU	0.03		g/g-day						
WATER INGESTION RATE													
Depocas et al. 1971	A	F	1	-	0.0013		g/g-day	0.0009	0.0016	2	British Columbia	captive	Seawater ingestion by: (1) Starved seals; (2) fed seals. Values are approximate. Sea water ingestion increased with food intake and is suggested to be coincidental to feeding rather than intentional.
	A	B	2	-	0.0048		g/g-day	0.0028	0.0091	5	1966-68		
INHALATION RATE													
Angell-James et al. 1981	J	B	R	-	21.3	8.2 SD	breath/min			8	from Bering Sea	lab	3-4 months old, weighted 13.2-21.4 kg (mean=16.9 kg); anesthetized.
Craig & Pasche 1980	J	M	SW	-	36.6	1.4 SE	breath/min			1	Oslo, Norway	lab	Two years old (frequency during surface time).
	J	F	SW	-	39.7	2.0 SE	breath/min			1	1975		
	J	M	R	-	36.2		breath/min			1			
	J	F	R	-	28.2		breath/min			1			
INHALATION VOLUME													
Angell-James et al. 1981	J	B	R	-	5.9	2.02 SD	m3/day			8	from Bering Sea	lab	Control value; anesthetized wt.=16.9 kg (range 13.2-21.4 kg); 3-4 months old.
	J	B	R	-	0.374	0.173 SD	m3/kg-day			8			
Craig & Pasche 1980	J	M	SW	-	47.9	3.0 SE	m3/day			1	Oslo, Norway	lab	Two years old. Volume while at surface; provides an overestimate of average daily breathing rate on land.
	J	F	SW	-	57.5	2.9 SE	m3/day			1	1975		
	J	M	R	-	47.7		m3/day			1			
	J	F	R	-	47.7		m3/day			1			

*** DIET ***

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Everitt et al. 1981 (richardsi)	A	B	walleye pollock	3.7	27.3	32.2	1.3		Washington 1978-79	coastal island	Protection Island population. One
			English sole	37.0	0.0	27.0	0			-	winter scat contained an octopus
			shiner perch	0.0	0.0	0.5	63.6			% of total fish	beak and two fall scats contained
			Pacific herring	0	54.6	3.9	28.6			otoliths; scat	squid beaks.
			Pacific cod	0	0	10.1	0			samples	
			rex sole	37	9.1	2.9	0				
			Pacific tomcod	3.7	0	4.7	0				
			rockfish	3.7	-	4.7	-				
			Dover sole	3.7	-	3.4	2.6				
			Petrale sole	7.4	-	1.8	-				
			other fish	3.8	9.0	8.8	3.9				
			(sample size)	(12)	(14)	(89)	(14)				
Everitt et al. 1981 (richardsi)	B	B	Pacific hake		51.2	60.0			Washington 1979	coastal island	Gertrude Island population.
			plain midshipman		11.0	16.1				-	
			shiner perch		15.6	4.2				% of total fish	
			English sole		6.3	8.4				otoliths; scats	
			Pacific tomcod		7.6	2.3					
			pile perch		-	3.9					
			staghorn sculpin		-	2.9					
			other fish		5.2	2.1					
			(sample size)		(44)	(57)					
Harkonen 1988 (vitulina)	A	B	Gadus morhua		37			32	Sweden 1980	marine islands	
			Ammodytidae		13					-	
			Trisopterus minutus		9					% weight; estimated	
			T. esmarkii		4					from otolith freq.	
			Microstomus kitt		21					& size in scats	
			Scomber scombrus		4						
			Enchelyopus cimbrius		2						
			Merlangius merlangus		2						
			other		8						
Harkonen 1988 (vitulina)	A	B	cod (Gadus morhua)		11			63	Scandinavia 1980	coastal/marine	
			Enchelyopus cimbrius		3					-	
			dab (Limanda limanda)		44					% weight; estimated	
			flatfish							from otolith freq.	
			(Pleuronectes plat)		13					& size in scats	
			Platichthys flesus		8						
			sandeels		9						
			other		12						
Jones 1981 (richardsi)	A	B	surfperches		41.9			8	California 1973	coastal/marine	
			blackbelly eelpout		27.9					-	
			flatfishes		9.3					% of total number	
			rock greenling		9.3					of fish otoliths;	
			Pacific tomcod		4.7					stomachs	
			other		6.9						

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Payne & Selzer 1989 (concolor)	B	B	American sandlance Gadidae (cod-like) flounder spp. Atlantic herring Atlantic mackerel skate (Raja spp.) squid (short finned or long finned)		74 8 5 5 1 2 5			234	s New England 1983-87	haul-out sites - % frequency of occurrence; scat analysis	Season is year-round. Scats collected at three haul-out sites on Cape Cod; otoliths and other parts (e.g., diagnostic bones) used to identify prey.
Perez 1990 (concolor)	A	B	Pacific herring salmon capelin euchalon & smelts walleye pollock Pacific cod saffron cod Arctic cod rockfishes Atka mackerel greenlings sculpins Pacific sandlance eelpouts flatfishes other fish (fish subtotal) squid octopus shrimp crab other (invert. subtotal)		5 1 5 4 12 8 3 <1 1 9 8 9 4 1 3 2 (75) 4 15 2 2 2 (25)				Bering Sea/Aleutians	coastal/marine - % wet weight; measure not specified	All seasons. Estimated from data contained in six other studies.
Pitcher 1980 (richardsi)	A	B	squid, octopus shrimp, crabs herring salmonids osmerids cod, tomcod, walleye pollock other		20 3.7 6.4 4.4 22.5 26.0 14.1			269	Gulf of Alaska 1973-78	coastal/marine - % wet volume; stomach contents	All seasons combined (i.e., not only summer).
Pitcher & Calkins 1979 (richardsi)	B	B	walleye pollock octopus capelin herring Pacific cod flatfishes shrimp		23.3 19.9 11.3 7.0 3.4 2.8 3.6			255	Gulf of Alaska 1975-78	coastal/marine - % of volume; based on wet weight of stomach contents	All areas, all seasons combined.

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Pitcher & Calkins 1979 (continued)			squid		1.8						
			euchalon		4.4						
			salmon		4.3						
			Pacific sandfish		3.2						
			sculpins		2.0						
			skates		3.0						
			Pacific sandlance		0.5						
			Pacific tomcod		1.7						
Pitcher & Calkins 1979 (richardsi)	J	B	-		% Occur.	95% C.L.		13	Gulf of Alaska 1975-78	coastal/marine - % frequency of occurrence +/- 95 % C.L.; stomach contents	All seasons; based on identifiable individual items, skeletal remains and otoliths. Ages of pups = between 2.5 and 11 months; small fish were the primary food.
			shrimp		7.1	19.4					
			capelin		35.7	32.1					
			Pacific tomcod		7.1	19.4					
			walleye pollock		35.7	32.1					
			Pacific sandlance		7.1	19.4					
			unident. fish		7.1	19.4					
Pitcher & Calkins 1979 (richardsi)	A	B	octopus		29.5			102	Kodiak Isl., Alaska 1975-78	coastal/marine -	All seasons.
			capelin		21.3						
			walleye pollock		5.8						
			flatfishes		5.8						
			Pacific cod		6.6						
			Pacific sandlance		1.1						
			herring		4.2						
			shrimps		2.2						
			salmon		2.9						
			sculpins		0.7						
			euchalon		4.6						
Pitcher & Calkins 1979 (richardsi)	B	B	octopus		17.6	17.7	30.4		Kodiak Isl., Alaska 1975-78	coastal/marine -	Seasons defined as: summer = 10 May to 30 Sept.; fall = 1 Oct. to 30 Nov.; winter = 1 Feb. - 9 May. 95% C.L. values for each value range from 5.2 to 12.9.
			salmon		5.4	0.0	0.0				
			capelin		20.3	4.8	5.4				
			Pacific cod		6.8	8.1	10.7				
			walleye pollock		12.2	9.7	14.3				
			Pacific sandlance		4.1	21.0	0.0				
Pitcher & Calkins 1979 (richardsi)	B	B	walleye pollock		46.6			83	Prince William Sound 1975-78	coastal/marine -	All seasons.
			herring		11.2						
			squids		5.9						
			octopus		5.4						
			salmon		10.0						
			capelin		3.8						
			Pacific tomcod		3.3						
			Pacific cod		0.9						
			saffron cod		1.3						
			euchalon		1.9						

Reference	Age	Sex	Food type	Spring	Summer	Fall	Winter	N	Location	Habitat - Measure	Notes
Pitcher & Calkins 1979 (richardsi)	B	B	octopus euchalon shrimps capelin		43.4 30.6 23.1 1.9			17	Low. Cook Inlet, AK 1975-78	coastal/marine - % of volume; stomach contents	All seasons.
Roffe & Mate 1984 (richardsi)	A	B	salmonid lamprey unidentified (non salmonid) unidentified (sample size)	42.8 28.6 7.2 21.4 (14)	12.2 25.0 30.0 32.8 (23)	45.7 2.3 5.1 46.6 (18)	20 60 0 20 (5)		Oregon 1976-78	Rogue River - % of prey number; from surface feeding observations	Seals most abundant from September-April; least abundant in summer. Taking of salmon believed to be over-valued here because seals are more likely to bring them to the surface.
Roffe & Mate 1984 (richardsi)	A	B	Salmo gairdneri Lampetra tridentatus Thaleichthys pacificus Microgadus proximus Glyptocephalus zachirus Citharichthys sordidus Parophrys vetulus unident. fish	23.1 92.3 23.1 7.7 7.7 7.7 7.7 23.1				13	Oregon 1976-78	Rogue River - % frequency of occurrence; gastro-intestinal tracts	Data is from 13 seals; 10 collected in spring, 1 in summer, and 2 in fall. Only includes species that were found three or more times.

*** POPULATION DYNAMICS ***

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
HOME RANGE SIZE/FORAGING RADIUS													
Beach et al. 1985	-	-	-	-	30-55		km				Washington	Columbia River	Travel distance; 75% of 58 seals radio-tagged in the Columbia River were relocated at haul-out sites 30-55 km away. As cited in Hoover 1988.
Brown & Mate 1983	-	-	-	-	25		km			5	Oregon	bays	Movements between bays; 5 of 11 radiotagged seals made at least one move between two bays 25 km apart. As cited in Hoover 1988.
Pitcher & McAllister 1981	-	-	-	-			km		24-194		Alaska	sw Tugidak Island	Distance between haulout sites used by radiotagged seals. Of 35 seals tagged, about 75% used the Tugidak Island site on a full-time basis while others used it in addition to sites from 24-194 km away. As cited in Hoover 1988.

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
Stewart et al. 1989	B	B	-	-	5		km		48	1	California 1988	Southern California Bight	One seal tracked by satellite telemetry for about two weeks indicated movements up to 48 km from haul-out, but most locations were within 5 km. Accuracy of locations at sea was +/- 15 km, however.
POPULATION DENSITY													
Richardson 1981 (concolor)	B	B	-	SU	0.0305		N/ha	0.00394	0.0611		Maine 1973	coastal/marine	Data on both harbor and gray seals from seven census flights.
LITTER SIZE													
Hoover 1988	-	-	-	-	1						throughout range	NS	
LITTERS/YEAR													
Hoover 1988	-	-	-	-	1		/yr				throughout range	NS	
DAYS GESTATION													
FAO Adv. Comm. 1976	-	-	-	-	10.5-11		months				NS	NS	As cited in Ronald et al. 1982.
Newby 1978	-	-	-	-	11		months				e Pacific coast	coastal/marine	
AGE AT WEANING													
Boulva & McLaren 1979 (concolor)	-	B	-	-	30		days				e Canada 1968-73	marine	The weaning process takes about one week.
Lawson & Renouf 1987	-	-	-	-	4		weeks				Newfoundland 1982	tidal bay	
Slater & Markowitz 1983 (richardsi)	-	B	-	-	35		days				c California 1978-79	coastal/marine	Approximate value.

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
AGE AT SEXUAL MATURITY													
Ashwell-Erickson & Elsner 1981	-	F	1	-	5		years				NS	NS	Age: (1) at first ovulation; (2) at first successful pregnancy.
	-	F	2	-	5.5		years						
Bigg 1969a (richardsi)	-	F	1	-	3.3	0.26 SE	years				British Columbia	coastal/marine	(1) Age at first ovulation; (2) age at first pregnancy. SE estimated from 95% CL. As cited in Pitcher and Calkins 1979.
	-	F	2	-	3.3	0.31 SE	years						
	-	M	-	-			years	3	6				
Boulva & McLaren 1979 (concolor)	-	M	-	-	6		years				e Canada 1968-73	marine	Only 50% of 4-year old females mature; 95% of 7+ year-olds are mature.
	-	F	-	-	3-4		years						
FAO Adv.Comm. 1976 (richardsi)	-	F	-	-			years	2	5		NS	NS	As cited in Ronald et al. 1982.
	-	M	-	-			years	3	6				
Newby 1978 (richardsi &) P. largha	-	M	-	-	4-5		years				Pacific coast	coastal/marine	Data is for both the richardi subspecies and P. largha.
	-	F	-	-	3-4		years						
Pitcher 1977 (richardsi)	-	F	1	-	3.7		years				Prince William Sound	coastal/marine	Age: (1) at first ovulation; (2) at first pregnancy. As cited in Pitcher and Calkins 1979.
	-	F	2	-	4.4		years						
	-	M	-	-			years	3	7				
Pitcher & Calkins 1979 (richardsi)	-	F	-	-	4.96	0.22 SE	years	3	7		Gulf of Alaska 1975-78	coastal/marine	Age at first ovulation. SE calculated from 95% CL of +/- 0.43.
Pitcher & Calkins 1979 (richardsi)	-	F	-	-	5.51	0.23 SE	years	4	9		Gulf of Alaska 1975-78	coastal/marine	For females age is at first pregnancy; SE calculated from 95% CL of +/- 0.46.
Pitcher & Calkins 1979 (richardsi)	-	M	-	-			years	5	7		Gulf of Alaska 1975-78	coastal/marine	
ANNUAL MORTALITY													
Boulva & McLaren 1979 (concolor)	A	B	-	-	17.5		%/yr				e Canada 1968-73	marine	Post-weaning mortality.
Pitcher & Calkins 1979 (richardsi)	J	B	1	-	77		%/4-yrs				Gulf of Alaska 1975-78	coastal/marine	Estimated cumulative mortality: (1) from birth to 4 years old; (2) for 4 year olds; (3) for 7 to 14 year olds; and (4) for 20 year olds.
	J	B	2	-	11		%/yr						
	A	B	3	-	8-9		%/yr						
	A	B	4	-	14		%/yr						

Reference	Age	Sex	Cond	Seas	Mean	SD/SE	Units	Minimum	Maximum	N	Location	Habitat	Notes
LONGEVITY													
FAO Adv. Comm. 1976	-	-	-	-			years		40		NS	NS	As cited in Ronald et al. 1982.
Newby 1978	-	-	1	-			years		30		e Pacific	wild	(1) Estimated natural longevity;
	-	-	2	-			years		33	1		captive	(2) maximum longevity of captive seal.
Pitcher & Calkins 1979 (richardsi)	A	M	-	-			years		26		Gulf of Alaska	coastal/marine	Approximately equal sex ratios were noted in all age groups except the oldest one (21-31 years); this group was 78% female. Few males over 20 years old were collected.
	A	F	-	-			years		31		1975-78		

*** SEASONAL ACTIVITIES ***

Reference	Begin	Peak	End	Location	Habitat	Notes
MATING						
Bigg 1969b		Feb		Mexico	NS	As cited in Hoover 1988.
Bigg 1969b		July		Bering Sea	NS	As cited in Hoover 1988.
Boulva & McLaren 1979 (concolor)	earl Apr		Jul	Nova Scotia, CAN 1968-73	coastal island	
PARTURITION						
Allen et al. 1989	late Mar			California	Gulf of Farallones	
Boulva and McLaren 1979 (concolor)		May 21-27		Nova Scotia, CAN 1968-73	coastal island	
FAO Adv. Comm. 1976	Mar		May	Washington		As cited in Ronald et al. 1982.
FAO Adv. Comm. 1976	Feb		Mar	Mexico		As cited in Ronald et al. 1982.
FAO Adv. Comm. 1976	Mar		Jun	w Atlantic		As cited in Ronald et al. 1982.
FAO Adv. Comm. 1976	Mar		Apr	Alaska		As cited in Ronald et al. 1982.

Reference	Begin	Peak	End	Location	Habitat	Notes
Johnson & Jeffries 1983 (richardsi)	May	1st week June	Jun	Washington 1975-77	marine/coastal	Along the coast and outer coast.
Johnson & Jeffries 1983 (richardsi)	Aug		Sep	Washington 1975-77	s Puget Sound	Pupping occurred later in southern Puget Sound (i.e., Aug and Sept) than the outer coastal areas of Washington (i.e., May and June).
Pitcher 1977	mid May	earl Jun	earl Jul	Prince William Sound	coastal/marine	As cited in Hoover 1988.
Pitcher & Calkins 1979 (richardsi)	mid May	mid Jun	late Jun	Tugidak Isl., Alaska 1975-78	island/marine	
Riedman 1990 (richardsi)	Jun		mid Jul	Bristol Bay, Alaska	coastal/marine	
Riedman 1990 (richardsi)	mid May		late Jun	Gulf of Alaska	coastal/marine	
Riedman 1990 (richardsi)	late Jun		Sep	w Canada	coastal/marine	
Riedman 1990 (richardsi)	earl May		late May	Washington	coastal/marine	
Riedman 1990 (richardsi)	late Mar		late May	n California	coastal/marine	
Riedman 1990 (richardsi)	late Apr		earl May	c California	coastal/marine	
Riedman 1990 (richardsi)	Mar		Apr	s California	coastal/marine	
Riedman 1990 (richardsi)	earl Feb			Mexico	coastal/marine	
Slater & Markowitz 1983 (richardsi)	mid Apr	late Apr		c California 1978-79	coastal/marine	Pups weaned on average by the end of May.
Wilson 1978/ Richardson 1973 (concolor)	mid May		mid June	New England	coastal/marine	As cited in Payne and Schneider 1984.

Reference	Begin	Peak	End	Location	Habitat	Notes
FALL MOLT						
Stutz 1966		none		NS	NS	As cited in Ling 1970.
SPRING MOLT						
Boulva & McLaren 1979 (concolor)		Jul		Nova Scotia, CAN 1968-73	coastal/island	Molting timing may vary locally.
Pitcher & Calkins 1979 (richardsi)	late Jun	late Jul	Sep/Oct	Gulf of Alaska 1975-78	coastal/marine	
Stutz 1966		spring		NS	NS	As cited in Ling 1970.
Thompson & Rothery 1987	7 Jun		6 Sep	Scotland 1985	coastal/marine	19-33 days to complete molt.
Thompson & Rothery 1987			Aug 15	Scotland 1985	coastal/marine	19-33 days to complete molt; data for a female on an island.
Thompson & Rothery 1987			Aug 16	Scotland 1985	coastal/marine	19-33 days to molt; data for a female on the mainland.
Thompson & Rothery 1987			Sep 3	Scotland 1985	coastal/marine	19-33 days to molt; data for a mature male.
Thompson & Rothery 1987			Aug 22	Scotland 1985	coastal/marine	19-33 days to complete molt; data for an immature male.
MIGRATION						
Schneider & Payne 1983 (concolor)	earl May			New England 1978-80	coastal/marine	Population leaves Stage Point, MA, prior to pupping season and travels north.
Schneider & Payne 1983 (concolor)	late Oct			New England 1978-80	coastal/marine	Study population leaves Maine following the pupping season and returns to Stage Point, MA.

